

**ALIGNMENT-MARK DETECTION METHODS AND DEVICES**  
**FOR CHARGED-PARTICLE-BEAM MICROLITHOGRAPHY,**  
**AND MICROELECTRONIC-DEVICE MANUFACTURING**  
**METHODS COMPRISING SAME**

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**Abstract of the Disclosure**

Methods and devices are provided that achieve accurate detection of the positions of alignment marks on wafer substrates and other specimens as used in charged-particle-beam (CPB) microlithography. A charged particle beam (e.g.,  
10 electron beam) is irradiated onto an area, of a specimen, lacking an alignment mark to obtain a first backscattered-particle signal regarded as "background." The beam is irradiated onto an area, of the specimen, where an alignment mark is present to obtain a second backscattered-particle signal. The difference of the first signal from the second signal is determined to produce a difference signal containing data  
15 concerning only aspects of the alignment mark and not of the background. The methods are especially useful whenever the specimen has crystalline properties that otherwise could affect the backscattered-particle signal.

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